



## Natural Heritage & Endangered Species Program

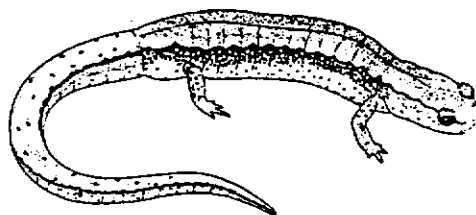
Commonwealth of Massachusetts  
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### MASSACHUSETTS SPECIES OF SPECIAL CONCERN

#### Four-toed Salamander (*Hemidactylium scutatum*)

**ETYMOLOGY:** The specific name *Hemidactylium* means partial digits or partial toes. The name *scutatum* signifies "covered with shieldlike plates," from Latin *scutatus*, "armed with a shield." The salamander's costal grooves produce a superficial resemblance to overlapping plates.

**DESCRIPTION:** The Four-toed Salamander is the smallest salamander found in Massachusetts and is easily identified by three distinctive characteristics. As its name implies, this salamander has only four toes on the hind feet (unlike most of the terrestrial salamanders which have five), a very distinct constriction at the base of the tail, and its belly resembles bright white enamel speckled with black.

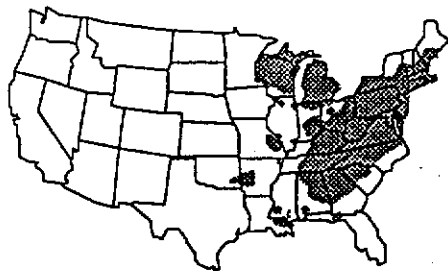


The dorsal coloration is reddish brown, fading to a gray or almost black color along the sides and into a white belly covered with black speckles the size and shape of coarse ground pepper. In the juvenile the underbelly is dusky with blue speckles. A short, wide, dark bar on the side of the head joins the eye and gills. The heads of newly hatched larvae are colored orange, green, and yellow with dark brown or black spots. The dark spots make a "Y" shape on the back of the head. They have a blunt snout, orange and black gills, a ventral and dorsal keel, and a very compressed trunk and tail.

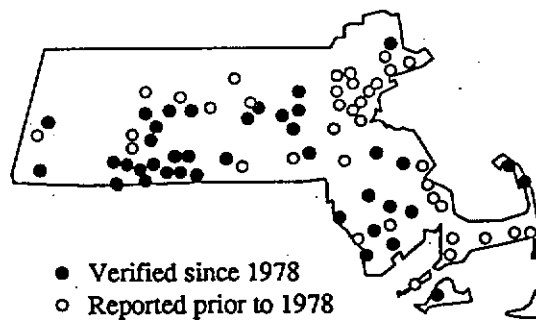
DeGraaf, Richard M. and Rudis, Deborah D.  
*Amphibians and Reptiles of New England*.  
Amherst, Massachusetts: The University of  
Massachusetts, 1983.

The body of the Four-toed Salamander is slender with 13 or 14 costal (ribbed) grooves. The males range from 5–7.6 cm (2–3 in) in total length. Females are slightly larger, ranging from 6.2–8.9 cm (2.8–3.5 in). The mature male is distinguished from the female by its smaller size, more slender form, relatively longer tail, and somewhat by its color, which on the dorsal surface of the male is slightly darker. Other differences are found in the shape of the snout of the male, which is squareish and truncated in front and swollen in the region of the naso-labial grooves. The upper lip overhangs the lower. In the female, the contour of the snout is rounded and the upper lip does not overhang the lower.

**SIMILAR SPECIES IN MASSACHUSETTS:** Like the Four-toed Salamander, the river-dwelling Mudpuppy



Range of the Four-toed Salamander



● Verified since 1978  
○ Reported prior to 1978

Distribution in Massachusetts

(*Necturus m. maculosus*) has only four toes. The Mudpuppy, however, is much larger in size, 20–33 cm (8–13 in.), has external gills, and has neither the belly pattern nor the constricted tail of the Four-toed Salamander. Redback Salamanders (*Plethodon cinereus*) may be similar in size and general color, however, they have five toes on their hind feet, and also lack the tail constriction and white and black belly pattern of the Four-toed Salamander.

**RANGE:** Four-toed Salamanders occur from southern Maine, Quebec, Ontario, and northern Wisconsin southward to North Carolina, South Carolina, Georgia, Alabama, and Tennessee. Disjunct populations occur in Nova Scotia, Missouri, Arkansas, Louisiana, Georgia, and Florida.

**HABITAT IN MASSACHUSETTS:** Breeding habitat, in the form of wetlands with hummocks of grasses, sedges or wet moss (usually sphagnum moss) adjacent to slow moving streams or pools of standing water, is an important factor limiting the occurrence of Four-toed Salamanders throughout their range. In Massachusetts, this species breeds in bogs, swamps dominated by red maple (*Acer rubrum*) and Atlantic white cedar (*Chamaecyparis thyoides*), vernal pools, and other perennial wetlands with sphagnum or other mosses. As a result of their preference for wetlands dominated by sphagnum, they are quite tolerant of acidic conditions. Larvae are found in small pools and slow moving streams associated with nesting areas. The adults are terrestrial and are generally found in forested areas near their breeding habitat. Four-toed Salamanders take refuge in wet moss, under fallen logs and other objects, in rotting wood, under stones or in the leaf litter. Distribution is limited to areas that provide both breeding and upland habitats in close proximity.

**LIFECYCLE/BEHAVIOR:** The Four-toed Salamander is an inconspicuous little creature and because of its small size and retiring habits is seldom observed. When one is uncovered, it may slip quickly beneath the humus with lizardlike speed, or lie motionless, relying on cryptic coloration. If threatened, it will curl and raise its lighter-colored tail above its back, offering a piece of tail in exchange for its life. The tail is fragile and easily detached at the constriction near its base. The salamander can even cause the loss of its own tail by pushing against an object. The detached part of the tail wriggles violently for several minutes, a temporary distraction to a potential predator that enables the salamander to escape. A new tail is soon regenerated.

The Four-toed Salamander reaches sexual maturity during its third year. The breeding season for this species lasts from late summer (early August) through fall (October). Mating and courtship take place on land and consist of the male rubbing his snout, lips, or the side of his body against the female's snout. Sperm are then transferred to the female by means of spermatophores, small packages of sperm, which are deposited on the substrate and then picked up by the female and held in her cloaca until the following spring. Spermatophores for this species are 2 mm high.

This species hibernates in and under rotting wood and leaves as well as in the channels of decaying tree roots. They have a tendency to clump together in small to rather large groups to hibernate, often in association with spring peepers, wood frogs, newts, and other species of salamanders. The Four-toed Salamander is one of the earliest to emerge from hibernation in the spring appearing from late March to early May. The females begin to migrate to suitable nesting sites at this time. These nesting sites are generally simple little cavities in the sphagnum moss, but the underside of stumps, rotten logs, leaf litter, and grass hummocks may also be used. They are invariably placed in the vicinity of water; usually 2–6 in. immediately above it, enabling the larvae to fall directly into the water after hatching. The nest cavity often has the appearance of being formed by turning movements of the female, but in some instances it is evident the female merely takes advantage of a natural opening in the moss or some hollow between the roots of a bog plant.

The eggs are laid from mid-April into June, depending on local climatic conditions. The female turns upside down, grasping rootlets and bits of moss with her feet while slowly forcing the eggs out into the nest cavity. The egg laying process requires several hours to complete. The eggs are laid singly, but adhere in a cluster. The number of eggs per clutch varies from 19 to 50; each egg being 5–6 mm in diameter. Communal nesting may occur with up to 800 eggs laid in a single nest. Females remain with their eggs throughout the incubation stage, generally 38 to 60 days, and desert the nests prior to hatching. If the nest is a communal one, only a few females will attend the eggs. The larvae are about 1.2 cm long when they hatch. They wriggle until they drop into the water. The larvae grow to 1.8–2.5 cm (.75–1.0 in) over a period of 6 weeks; although the larval period may last up to 18 weeks depending on pond conditions. At that time, the larvae transform into adults and leave the water.

The diet of Four-toed Salamanders consists of ticks, spiders, springtails, midges, ground beetles, rove beetles, fly larvae, parasitic wasps, ants, earthworms, and snails.

**POPULATION STATUS IN MASSACHUSETTS:** The Four-toed Salamander is listed as a Species of Special Concern in Massachusetts. This species is rather rare, but widespread in the state. Historically (prior to 1978), there were 41 individual sightings in 39 locations recorded throughout the Commonwealth. Some of these localities no longer support populations due to urbanization and development. Since 1978, forty-seven individual sightings have been reported to the Natural Heritage and Endangered Species Program from 40 locations across the state. Of these sightings, only two locations reflect historical sightings. Due to its nocturnal habits and reclusive behavior, this species is difficult to observe and, though rare, additional "populations" may occur in locations not yet recorded.

**MANAGEMENT RECOMMENDATIONS:** The greatest threat to the Four-toed Salamander is habitat destruction resulting from road construction, development, and timber harvesting in and around boggy wetlands, peatlands, and forested wetlands. Given the Four-toed's preference for nesting sites in bogs with sphagnum moss, every effort must be made to protect the natural state of the bog areas throughout Massachusetts. Additional efforts should be made to determine the status of historic "populations" and to look for new occurrences of this species. Protection of both the breeding and adjacent non-breeding habitat is necessary to ensure the survival of the species. In particular, suitable nesting substrate - sphagnum hummocks abutting pools of water deep enough for larval survival - may be limited, even within relatively large wetlands. Every effort should be made to identify areas that could potentially serve as nesting habitat and locate work away from these areas. Besides habitat loss, threats to populations are unknown but may include acid precipitation and flooding. Unlike other salamanders whose reproduction has been adversely affected by acid precipitation, the Four-toed Salamander may have some tolerance in this area. With its preference for an acidic environment, acid precipitation is less likely to affect significantly the Four-toed's reproductive capabilities, but there are limits to its tolerance.

1994

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